

been received of the lowest barometer readings in the immediate center of this disturbance, but the fact that winds of hurricane velocity occurred off the North Carolina coast would lead to the supposition that the disturbance was one of major intensity, but not actually of tropical origin. So far as known no American vessels were destroyed in either of these disturbances. It is a fact of importance, however, that the Diamond Shoals Lightship was blown 12 miles from its moored position by the second of these disturbances. Details concerning these two disturbances will be found elsewhere in this number of the REVIEW.—*Edward H. Bowie.*

## CHICAGO FORECAST DISTRICT.

No general frost warnings were issued during the month. Unseasonable warm weather prevailed throughout the Chicago Forecast District until the 8th, when warnings were issued for the northern Rocky Mountain region and the northeastern slope. After that date warnings were issued for limited areas on several dates. No warnings were issued, however, for sections farther south than western and northern Nebraska, northern Iowa, and the central portions of Wisconsin and lower Michigan. At the end of the month killing frost had occurred at only three stations in the district, as follows: Yellowstone Park, Wyo., on the 8th; Valentine, Nebr., on the 19th; and Sault Ste. Marie, Mich., on the 25th.

Following the warm spell the first part of the month, frost warnings or advisory messages were sent to points in the cranberry regions of Wisconsin on 15 dates. The lowest temperature registered was 20° at Mather on the 16th. Warnings were also issued for the tobacco region of Wisconsin on the 15th, 16th, and 19th; however, no damaging frosts occurred.

Special daily fire-weather warnings were continued to the district forester at Missoula, Mont., until September 14. Daily fire-weather warnings for northeastern Minnesota were sent to the State forester at St. Paul until September 20.

Special forecasts were issued for the Kansas Free Fair, which was held at Topeka from September 11 to September 15, inclusive; and for the Illinois State Fair, which was held at Springfield from the 16th to the 23d, inclusive.

There were no storms on the Great Lakes during the month. The only warnings issued were small-craft warnings for the lower Lakes from Sandusky eastward on the 10th.—*Chas. L. Mitchell.*

## NEW ORLEANS FORECAST DISTRICT.

Disturbed conditions prevailed off the Texas coast in the vicinity of Corpus Christi from the 17th to the 20th, with squally weather south of Matagorda Bay on the 17th and during the night of the 19th-20th. Anticyclones of considerable extent prevailed in the interior of the United States at the time and winds were mostly from the northeast. These conditions were preceded and attended by excessive rainfall on the Texas coast, over 13 inches being recorded at Corpus Christi during the period of the 15th-20th. Northeast storm warnings were displayed on the Texas coast from Galveston to Corpus Christi during the afternoon and night of the 17th. The stormy conditions, however, did not extend as far north as Galveston. No other warnings were issued or required during the month.—*R. A. Dyke.*

## DENVER FORECAST DISTRICT.

Although a number of areas of low and high pressure of considerable intensity advanced from the North Pacific coast southeastward or eastward over the northern Rocky Mountain region and the Missouri Valley, no cyclones or anticyclones of importance crossed the Denver district. As a whole, the month was much drier than the average, and it was also one of the warmest Septembers on record.

On the morning of the 9th a warning was issued for frost at the higher elevations of southern Utah, and on the morning of the 28th of frost at the higher elevations of northern Arizona and in northern and western Utah. These warnings were justified by the occurrence on the following mornings of minimum temperature favorable for frost, except on the morning of the 29th at Salt Lake City, where the weather was cloudy and the temperature did not fall below 50°.

A warning of probable frost, issued for northeastern Colorado on the morning of the 15th, was not verified, owing to the fact that the crest of a high-pressure area of unusual intensity, which was over southern Saskatchewan and western North Dakota, did not advance as far southward as was expected.

No reports of frosts were received from any of the regular stations of the District during the month.—*J. M. Sherier.*

## SAN FRANCISCO FORECAST DISTRICT.

Two well-marked storms from the North Pacific during the month passed inland far enough south to give rain in the northern portion of this district. The rainfall was quite generous in western Washington but in other sections it was light.

A period of very warm weather prevailed over the southern portion of the district from the 7th to the 25th and over the northern portion from the 10th to the 19th. Records for high temperatures in September were broken on the 10th, at Red Bluff and Roseburg, and equaled on the 11th, at Portland.

Light frost occurred in eastern Washington and Idaho on the 8th, in southern Idaho and Nevada on the 28th and 29th, and killing frost in eastern Oregon on the 28th.

Fire-weather warnings were issued in California on the 22d, and to the forest supervisor at Wenatchee on the 16th.

Advisory warnings of a severe storm in the North Pacific moving southeastward, were sent to Washington and Oregon stations on the 23d, warning vessels about to sail for Alaska and the Orient.

Southwest storm warnings were ordered at Washington and Oregon stations on the 25th. These were not verified but the magnitude of the storm is believed to have justified them.

Rain warnings were issued in northern California on the 26th, but the rain was confined to the coast sections.—*G. H. Willson.*

## RIVERS AND FLOODS.

By E. W. GRAEFF, Temporarily in Charge.

The lower Rio Grande River was in flood at Rio Grande City, Tex., on September 21 and 22, with a crest stage of 19.0 feet on the 21st, or 4.0 feet above the flood stage. Warnings of this rise were issued on the 20th.

Heavy rains fell between the 12th and 21st. These rains swelled the Rio San Juan, a tributary from Mexico, which caused a flood of serious proportions from McAllen, Tex., to the Gulf. The damage was very small, as the levees had been strengthened and most of the crops harvested.

At San Benito, Tex., a damage of \$50,000 resulted, due to injury to fruit trees, rendering of roads impassable, etc.

Low water has set in in practically all of the other rivers throughout the country. In the Ohio River navigation was suspended for a distance of 500 miles, from Cairo northward, being the lowest stage in that portion of the river during the last 15 years.

*Flood stages during September, 1922.*

| River and station.        | Flood stage. | Above flood stages—dates. |     | Crest. |       |
|---------------------------|--------------|---------------------------|-----|--------|-------|
|                           |              | From—                     | To— | Stage. | Date. |
| WEST GULF DRAINAGE.       |              |                           |     |        |       |
| Rio Grande:               | Feet.        |                           |     | Feet.  |       |
| Rio Grande city, Tex..... | 15           | 21                        | 22  | 19.0   | 21    |

**MEAN LAKE LEVELS DURING SEPTEMBER, 1922.**

By UNITED STATES LAKE SURVEY.

[Detroit, Mich., Oct. 5, 1922.]

The following data are reported in the "Notice to Mariners" of the above date:

| Data.   | Lakes. <sup>1</sup> |                     |        |          |
|---|---------------------|---------------------|--------|----------|
|   | Superior.           | Michigan and Huron. | Erie.  | Ontario. |
| Mean level during September, 1922:              | Feet.               | Feet.               | Feet.  | Feet.    |
| Above mean sea level at New York.....           | 602.69              | 580.33              | 572.33 | 246.03   |
| Above or below—                                 |                     |                     |        |          |
| Mean stage of August, 1922.....                 | +0.06               | -0.23               | -0.17  | -0.53    |
| Mean stage of September, 1921.....              | +0.02               | +0.29               | +0.16  | +0.60    |
| Average stage for September, last 10 years..... | -0.07               | -0.43               | -0.18  | -0.19    |
| Highest recorded September stage....            | -1.39               | -3.10               | -1.61  | -1.58    |
| Lowest recorded September stage....             | +1.20               | +0.67               | +1.05  | +2.03    |
| Average relation of the September level to:     |                     |                     |        |          |
| August level.....                               |                     | -0.20               | -0.30  | -0.40    |
| October level.....                              |                     | +0.20               | +0.30  | +0.40    |

<sup>1</sup> Lake St. Clair's level: In September, 575.19 feet.

**INFLUENCE OF WEATHER ON CROPS AND FARMING OPERATIONS.**

By J. WARREN SMITH, Meteorologist.

September, 1922, on the whole, was generally warm for the season, with abundant sunshine and scanty precipitation. The middle portion of the month was cool, however, from the extreme upper Mississippi Valley eastward, with general frosts in the northern border States

east of Montana, but owing to the advanced condition of crops, comparatively little harm resulted. Considerable frost damage occurred in Idaho and some harm in Washington and Oregon during the first part of the month. Under the influence of warm, sunshiny weather, late crops matured rapidly, especially during the latter part of the month, and conditions were favorable for harvesting.

Considerable rain fell early in the month in the extreme northwestern Great Plains and at the same time soil-moisture conditions were benefited by showers in considerable of the winter-wheat belt, where it had previously been too dry, but moisture continued deficient in many important wheat areas. During the latter part of the month there was insufficient moisture for the preparation of the soil and seeding winter grains in nearly all sections of the country, and this work made generally poor progress, although the soil condition continued satisfactory in some sections, particularly in the extreme lower Missouri Valley, including the eastern half of Kansas.

Late corn was benefited by rain during the first decade of the month in parts of the central and lower Mississippi and lower Ohio Valleys, but moisture was insufficient in most southern districts. The crop matured too rapidly under the influence of high temperatures and drought in parts of Iowa, but the general condition in that State continued fair to very good. Corn matured and dried out very fast during the latter part of the month and cutting made rapid progress, with some husking under way at the close. Very little frost damage occurred and at the close of the month the crop was practically safe from frost in all sections.

There was considerable rainfall in the western cotton-growing States at about the 10th of the month, which relieved the severe drought that had been prevailing in that section. Cotton had reached such an advanced stage of development, however, that the rainfall was not of material benefit, and the crop continued to deteriorate, or to make poor progress in nearly all sections of the belt. There was abundant sunshine and but little rainfall throughout nearly all of the cotton-growing States. These conditions were very favorable for picking and ginning and this work made rapid progress. At the close of the month the crop had been nearly all gathered in southern Texas and picking had been nearly completed in Georgia, except in the northern division.

There was not enough rain for late truck, garden crops, and grasses, and these needed more moisture in nearly all sections of the country. It was too dry, also, for planting fall and winter crops in much of the Southeast, but sugar cane developed satisfactorily in the lower Mississippi Valley. Stock continued in good condition in the central and upper Rocky Mountains and upper Great Plains States, but were thin and poor in most of New Mexico and portions of western Texas. The weather was generally favorable during the month for the maturing and harvesting of fruit, although there was too much moisture for citrus on the lowlands in Florida.